

Morishita, Don W.<sup>1</sup>, Joel Felix<sup>2</sup>, Donald L. Shouse<sup>1\*</sup> and J. Daniel Henningsen<sup>1</sup>, <sup>1</sup>University of Idaho, Twin Falls R&E Center, P.O. Box 1827, Twin Falls, ID 83303 and <sup>2</sup>Oregon State University, Malheur Experiment Station, Ontario, OR 97914. **Volunteer potato timing of removal with and without glyphosate in sugar beet.**

### ABSTRACT

Sugar beet often follows potato in southern Idaho and eastern Oregon crop rotations. Depending on post-harvest environmental conditions and management practices, volunteer potato can be a serious problem in sugar beet production. In conventional sugar beet, hand weeding is the most effective control method. Glyphosate tolerant sugar beet provides a potentially more effective alternative for controlling volunteer potato. Field experiments were conducted at the University of Idaho Research and Extension Center near Kimberly and Oregon State University Malheur Experiment Station near Ontario to determine the timing of volunteer potato removal on sugar beet yield with and without glyphosate.

Experiments were conducted from 2006 to 2008. The experimental design for all studies was a randomized complete block with four replications. Individual plots were four rows wide by 30 ft long on 22 inch row spacing. Sugar beet was planted May 1, 2006, April 14 and 17, 2007, at Idaho and Oregon, respectively, and April 10, 2008 at a density of 57,000 seed/A at Idaho and thinned to an 8 inch spacing at Oregon. Whole potato tubers averaging 3 oz were planted within each row at a density of 8,168 tubers/A (34 plants/100 ft row) on May 1, 2006, April 13, 2007 at Idaho and Oregon, and on April 9, 2008. Volunteer potato removed by hand was manually cutting potato shoots 1 cm below the soil surface when potato growth attained the following growth stages: 1) 4-inch rosette, 2) hooking (pre-tuber initiation), 3) tuber initiation, 4) early tuber bulking, and 5) mid-tuber bulking. Additional potato removal treatments were included to anticipate shoot re-growth and these treatments included: 6) remove as-needed at 4-inch rosette, 7) remove as-needed at tuber hooking, 8) remove as-needed at tuber initiation, 9) potato not removed and 10) potato-free treatments were included. In the potato removal with glyphosate study, the herbicide was applied at the same growth stages as in the hand removal study. Glyphosate was applied at 0.75 lb ae/A at the desired growth stages. In the remove as-needed treatments, shoots were cut or sprayed each time potato plants had re-grown to 4-inch rosettes. Tubers in the 'not removed' treatment had the highest average tuber yield at 7.8 ton/A. Weed control was maintained with three applications of ethofumesate & phenmedipham & desmedipham plus triflusaluron at 0.25 + 0.0156 lb ai/A. The applications were made at the sugar beet cotyledon, 2 leaf and 4 leaf growth stages. Herbicides were applied in a broadcast spray using a CO<sub>2</sub>-pressurized bicycle-wheel plot sprayer equipped with 8001 flat fan nozzles at 15 gpa. Hand weeding was used to control other weeds not controlled by the herbicides. Potato tubers were harvested from 4 representative plants in the two center rows of each plot on September 28, 2006, Sept 27 and November 16, 2007 at Idaho and Oregon, respectively, and October 15, 2008. Harvested tubers were sorted by weight and counted. Sugar beet was harvested from the two center rows in each plot on October 3, 2006, and October 1, and November 16, 2007 at Idaho and Oregon, respectively and on October 16, 2008. Sugar beet quality was determined by collecting representative root samples from each plot and submitting them to the Amalgamated Sugar Company's tare laboratory.

The optimum removal time for volunteer potato by hand varied somewhat by year. Optimum removal time in 2006 and at Oregon in 2007 was by tuber initiation. Removal before tuber initiation required multiple removals and removal after tuber initiation resulted in a sugar beet yield reduction. In 2007 at Idaho, volunteer potato was not as competitive and did not need to be removed until after mid-tuber bulking. may be at tuber initiation. Sucrose yield followed the same pattern as root yield response. With the glyphosate tolerant sugar beet in 2007 at Idaho, a single glyphosate application as early as 4-inch rosette reduced volunteer potato interference enough to eliminate a yield reduction. Volunteer potato needed to be sprayed by early tuber bulking to avoid a beet yield loss. At Oregon, volunteer potato needed to be treated by tuber initiation in both years to avoid a beet yield reduction. Similar to Idaho result, a single glyphosate application in Oregon in 2007 was enough to reduce volunteer potato interference. However, multiple glyphosate applications were need in 2008 until early tuber bulking to avoid a beet yield reduction. Sucrose yield in the glyphosate study also followed the same root yield pattern that was observed with the hand removed volunteer potato. With regard to volunteer potato production, not removing the potatoes had a similar effect on sugar beet yield as was observed in the volunteer potato density study.